

WE CLAIM:

1. A pallet orienting apparatus for orienting planar pallets in a return lane of a live storage system, comprising: pallet receiving means for receiving a plurality of pallets; and means for mounting said pallet receiving means for movement thereof between a pallet-receiving position in which a number of pallets oriented in substantially upright planes may be placed in the pallet receiving means to form a row of pallets; and a pallet-delivery position wherein the pallets are presented as a stack of pallets with each pallet in a generally horizontal plane.

2. The pallet orienting apparatus defined in claim 1, wherein the pallet-receiving means is dimensioned to receive two or more rows of pallets oriented in substantially upright planes when in the pallet-receiving position, and to present a corresponding number of stacks of pallets with each pallet in a generally horizontal plane when in the pallet-delivery position.

3. The pallet orienting apparatus defined in claim 1 wherein the pallet-receiving means is mounted to a supporting structure for pivoting movement, and the movement between the pallet-receiving position and the pallet-delivery position

5 comprises rotation about a horizontal axis.

1 4. The pallet orienting apparatus defined in claim 1
2 wherein said pallet-receiving means is mounted to a supporting
3 structure by a mechanism which permits the pallet-receiving means
4 to move relative to the supporting structure between its pallet-
5 receiving and pallet-delivery positions.

1 5. The pallet orienting apparatus defined in claim 4
2 wherein the movement between the pallet-receiving position and
3 pallet-delivery position is a combination of both rotation and
4 translational movement relative to the supporting structure.

1 6. The pallet orienting apparatus defined in claim 1,
2 further comprising stop means for limiting the movement of the
3 pallet-receiving means.

1 7. The pallet orienting apparatus defined in claim 1
2 wherein the pallet-receiving means is provided with a position
3 sensor to detect when the pallet-receiving means is in the
4 pallet-receiving position.

1 8. The pallet orienting apparatus defined in claim 1
2 wherein the pallet-receiving means is provided with a position
3 sensor to detect when the pallet-receiving means is in the

4 pallet-delivery position.

1 9. The pallet orienting apparatus defined in claim 1,
2 further comprising a drive means for moving the pallet-receiving
3 means between the pallet-receiving position and the pallet-
4 delivery position.

1 10. The pallet orienting apparatus defined in claim 9,
2 further comprising a control system for said drive means and
3 provided with detector means for detecting the presence of a
4 pallet in the pallet-receiving means, the control system being
5 operable to place the pallet-receiving means in its pallet-
6 receiving position when no pallet is detected.

1 11. The pallet orienting apparatus defined in claim
2 10, wherein the control system is operable to place the pallet-
3 receiving means in its pallet-delivery position when a
4 predetermined number of pallets is detected.

1 12. The pallet orienting apparatus defined in claim 9
2 wherein said drive means is manually operated.

1 13. The pallet orienting apparatus defined in claim 9
2 wherein said drive means is operated to place the pallet-
3 receiving means in its pallet-delivery position by moving a guard
4 into a position to prevent access to the apparatus.

5 14. The pallet orienting apparatus defined in claim 13
6 wherein said drive means is operated to place the pallet-
7 receiving means in its pallet-delivery position by moving a guard
8 into a position to permit access to the apparatus.

1 15. The pallet orienting apparatus defined in claim 1
2 wherein the pallet-receiving means is releasably retainable in
3 the pallet-receiving position by a first latching arrangement.

1 16. The pallet orienting apparatus defined in claim 15
2 wherein the first latching arrangement comprises a latching
3 element provided on the supporting structure and a detent on the
4 pallet-receiving means.

1 17. The pallet orienting apparatus defined in claim 1
2 wherein the pallet-receiving means is releasably retainable in
3 the pallet-receiving position by a second latching arrangement.

1 18. The pallet orienting apparatus defined in claim 17
2 wherein the second latching arrangement comprises a latching
3 element provided on the supporting structure and a detent on the
4 pallet-receiving means.

1 19. The pallet orienting apparatus defined in claim 18
2 wherein said pallet-receiving means is releasably retainable in
3 the pallet-receiving position by a first latching arrangement and

4 wherein the first and second latching arrangements each comprise
5 a respective latching element provided on the supporting
6 structure and a common detent provided on the pallet-receiving
7 means.

1 20. The pallet orienting apparatus defined in claim 18
2 wherein said pallet-receiving means is releasably retainable in
3 the pallet-receiving position by a first latching arrangement and
4 wherein the first and second latching arrangements each comprise
5 a respective detent provided on the supporting structure and a
6 common latching element provided on the pallet-receiving means.

1 21. The pallet orienting apparatus defined in claim 3
2 wherein the position of the pivot axis is so selected that, when
3 the pallet-receiving means is empty the pallet receiving means
4 tends to rotate under its self-weight towards the pallet-
5 receiving position and when the pallet-receiving means is loaded
6 with pallets, the position of the combined center of gravity of
7 the pallet receiving means and pallets causes the pallet-
8 receiving means to rotate towards the pallet-delivery position.

1 22. The pallet orienting apparatus defined in claim 21
2 wherein counterbalancing weights or springs are provided to
3 ensure that the pallet-receiving means rotates to its respective
4 loading and unloading positions when empty and filled.

1 23. The pallet orienting apparatus defined in claim 1,
2 further comprising friction dampers on the pallet-receiving means
3 to control motion thereof.

1 24. The pallet orienting apparatus defined in claim 18
2 wherein the pallet-receiving means comprises a base frame for
3 engaging an edge of a pallet in the pallet-receiving position,
4 and a back frame arranged perpendicular to the base frame for
5 engaging an undersurface of a pallet in the pallet delivery
6 position.

1 25. The pallet orienting apparatus defined in claim 24
2 wherein the base frame and back frame are formed as an open
3 framework structure.

1 26. The pallet orienting apparatus defined in claim 24
2 wherein the base frame and back frame are formed as panels.

1 27. The pallet orienting apparatus defined in claim 24
2 wherein the base frame and back frame are formed as solid panels.

1 28. The pallet orienting apparatus defined in claim 24
2 wherein the base frame and back frame are formed as a load-
3 bearing framework with a covering of mesh panels.

1 29. A pallet live storage system comprising a supply
2 lane for loaded pallets and a return lane for empty pallets,
3 wherein the return lane is provided with pallet orienting
4 apparatus comprising pallet-receiving means movable between a
5 pallet-receiving position in which a number of pallets oriented
6 in substantially upright planes may be placed in the receiving
7 means to form a row of pallets, and a pallet-delivery position
8 wherein the pallets are presented as a stack of pallets with each
9 pallet in a generally horizontal plane.

1 30. The pallet live storage system defined in claim 29
2 wherein the pallet-receiving means is adapted to receive two or
3 more rows of pallets oriented in substantially upright planes
4 when in the pallet-receiving position, and to present a
5 corresponding number of stacks of pallets with each pallet in a
6 generally horizontal plane when in the pallet-delivery position.

1 31. The pallet live storage system defined in claim 29
2 wherein the pallet-delivery position, the height of the pallet-
3 receiving means is so arranged that the lowermost pallet in the
4 or each stack is presented at the same level as the entry ends of
5 the supply lanes.

1 32. The pallet live storage system defined in claim 29
2 wherein ramps are provided in the return lane.

1 33. The pallet live storage system defined in claim 32
2 wherein the ramps have a low-friction inclined surface.

1 34. The pallet live storage system defined in claim 32
2 wherein the ramps have an inclined surface formed by the upper
3 run of a belt extending between two pulleys.

1 35. The pallet live storage system defined in claim 32
2 wherein the ramps are mounted to the pallet-receiving means and
3 move therewith.

1 36. The pallet live storage system defined in claim 29
2 wherein the supply line is provided with pallet erector means for
3 moving an empty pallet from a generally horizontal position to a
4 generally vertical orientation.

1 37. The pallet live storage system defined in claim 36
2 wherein the pallet erector means comprises an erector arm for
3 engaging the underside of an empty pallet, and drive means for
4 raising the arm.

1 38. A method of disposing of empty pallets in a pallet
2 live storage system wherein products are picked from loaded
3 pallets presented generally horizontally at a picking face of
4 picking aisle, comprising the steps of:

5 erecting an empty pallet to a substantially upright
6 position;
7 moving the empty pallet along the picking aisle to a
8 return lane;
9 placing the pallet into a pallet-receiving means of a
10 pallet orienting apparatus;
11 moving the pallet-receiving means from a pallet-
12 receiving position to a pallet delivery position; and
13 removing the pallet from the pallet receiving means.

1 39. The method defined in claim 38, further including
2 the step of returning the pallet-receiving means to the pallet-
3 receiving position.

1 40. The method defined in claim 38 wherein the stop of
2 erecting the empty pallet is performed manually.

1 41. The method defined in claim 38 wherein the step of
2 erecting the empty pallet is performed by a pallet erector means.